CMPT225 Assignment 4

Experiment 1

- Inserted 100000 elements in array.
- Loop two does 16 times more operation that loop one does.
- Most time is spent on cache misses.
- Result: loop 1 and loop 2 have similar time span. The time span depends on cache misses not the number of operations.

	Loop 1 (second)	Loop 2 (second)
Run 1	0.002	0.003
Run 2	0.003	0.003
Run 3	0.003	0.003
Run 4	0.002	0.001
Run 5	0.002	0.002
Run 6	0.001	0.001
Run 7	0.003	0.003
Run 8	0.001	0.002
Run 9	0.003	0.003
Run 10	0.002	0.002
Run 11	0.003	0.002
Run 12	0.003	0.002
Average run time	**0.00233**	**0.00225**

Experiment 3

- Inserted same 500000 random integers to array, linked list, and unrolled linked list.
- 12 runs. Each run is inserted with different numbers.
- Result: array < unrolled LL < Linked List
- The time traversal in an array is the fastest compare to the lists that use pointers. This is because the hardware is able to prefetch the next cache line according to your algorithm. However, since pointer are pointers to address that can be at anywhere, hardware are not able to prefetch. Most of the time in lined list is spend on cache misses.

	Array (second)	Unrolled LL(second)	Linked list(second)
Run 1	0.002	0.002	0.003
Run 2	0.001	0.002	0.002
Run 3	0.001	0.002	0.002
Run 4	0.001	0.002	0.003
Run 5	0.001	0.001	0.003
Run 6	0.002	0.001	0.002
Run 7	0.001	0.001	0.003
Run 8	0.001	0.001	0.003
Run 9	0.001	0.001	0.003
Run 10	0.001	0.002	0.003
Run 11	0.001	0.001	0.003
Run 12	0.001	0.001	0.001
Average run time	**0.00117**	**0.00142**	**0.00258**